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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/047,992	01/17/2002	Hitoshi Ohashi	020052	5363
23850	7590	05/08/2006		
ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP 1725 K STREET, NW SUITE 1000 WASHINGTON, DC 20006			EXAMINER TALBOT, BRIAN K	
			ART UNIT	PAPER NUMBER
			1762	

DATE MAILED: 05/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/047,992	<b>Applicant(s)</b> OHASHI ET AL.	
	<b>Examiner</b> Brian K. Talbot	<b>Art Unit</b> 1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 February 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,7,8,11,17,18 and 51-56 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,7,8,11,17,18 and 51-56 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                                                        |                                                                                         |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                            | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/3/06 has been entered.

2. The non-entered amendment filed 2/14/06 has been entered per filing the RCE. Claims 2-6,9-10,12-16 and 19-50 have been canceled. Claims 51-56 have been added. Claims 1,7,8,11,17,18 and 51-56 remain in the application.

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Claim Rejections - 35 USC § 112***

4. Claims 1 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claims 1 and 11, the claims recite a "first" molten metal, however, the claims do not recite a "second" molten metal and hence the term is not further limiting.

Art Unit: 1762

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

***Claim Rejections - 35 USC § 103***

6. Claims 1 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sterett et al. (5,746,844) in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711).

Sterett et al. (5,746,844) teaches a method and apparatus for creating a three dimensional article using a layer-by-layer deposition of molten metal and annealing. The molten metal is applied by depositing the droplets in a predetermined pattern and rate (abstract).

Sterett et al. (5,746,844) fails to teach measuring and comparing data calculated by a monitoring device to control the deposited material.

Kudoh et al. (4,656,048) teaches a method of forming thick film circuit patterns with a sufficiently wide and uniform strip. The monitoring system measures and controls the distance of the nozzle from the substrate and compares that to a set value and performs and necessary changes to maintain the desired value (col. 2, lines 30-40, col. 3, line 55 – col. 4, line 35).

Art Unit: 1762

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Sterett et al. (5,746,844) deposition process by incorporating a measuring/control system as evidenced by Kudoh et al. (4,656,048) to produce the desired circuit pattern.

Sterett et al. (5,746,844) in combination with Kudoh et al. (4,656,048) fail to disclosed the molten metal grains overlapping one another.

Tseng et al. (6,309,711) teaches a method of manufacturing a three-dimensional object whereby molten metal is jetted toward a substrate whereby the metal deposits are overlapping (abstract and Fig. 2).

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Sterett et al. (5,746,844) in combination with Kudoh et al. (4,656,048) process by applying the molten metal material to be in overlapping fashion as evidenced by Tseng et al. (6,309,711) with the expectation of achieving the similar results, i.e. a conductive circuit.

Claims 1 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orme-Marmerelis et al. (6,520,402) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711).

Orme-Marmerelis et al. (6,520,402) teaches a high speed direct writing with metallic microspheres. Small droplets of molten metal are generated toward a substrate to form conductive traces (abstract).

JP 10-226,803 teaches a three dimensional body formed by various kinds of materials. Molten metal is spouted from a nozzle (10) to form droplets (20) that are applied to a substrate to form electric circuits (abstract).

Orme-Marmerelis et al. (6,520,402) or JP 10-226,803 fail to teach measuring and comparing data calculated by a monitoring device to control the deposited material.

Features described concerning Kudoh et al. (4,656,048) above are incorporated here.

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Orme-Marmerelis et al. (6,520,402) or JP 10-226,803 deposition process by incorporating a measuring/control system as evidenced by Kudoh et al. (4,656,048) to produce the desired circuit pattern.

Orme-Marmerelis et al. (6,520,402) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) fail to disclosed the molten metal grains overlapping one another.

Tseng et al. (6,309,711) teaches a method of manufacturing a three-dimensional object whereby molten metal is jetted toward a substrate whereby the metal deposits are overlapping (abstract and Fig. 2).

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Orme-Marmerelis et al. (6,520,402) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) process by applying the molten metal material to be in overlapping fashion as evidenced by Tseng et al. (6,309,711) with the expectation of achieving the similar results, i.e. a conductive circuit.

Art Unit: 1762

Claims 7,8,17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orme-Marmerelis et al. (6,520,402), Sterett et al. (5,746,844) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711) further in combination with Pan (6,501,663).

Features described above concerning Orme-Marmerelis et al. (6,520,402), Sterett et al. (5,746,844) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711) are incorporated here.

Orme-Marmerelis et al. (6,520,402), Sterett et al. (5,746,844) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711) fail to specifically teach forming an insulating layer atop the molten layer.

Pan (6,501,663) teaches a three dimensional interconnect whereby an interconnect is covered with an insulator layer to protect the interconnect (abstract and Figs 5-7).

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Orme-Marmerelis et al. (6,520,402), Sterett et al. (5,746,844) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711) by incorporating an insulator layer atop the molten metal circuit layer as evidenced by Pan (6,501,663) with the expectation of achieving a multilayered structure or a protective layer for the circuitry.

Claims 51-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orme-Marmerelis et al. (6,520,402), Sterett et al. (5,746,844) or JP 10-226,803 in combination with

Art Unit: 1762

Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711) still further in combination with JP 11-040937.

Features described above concerning references Orme-Marmerelis et al. (6,520,402), Sterett et al. (5,746,844), JP 10-226,803, Kudoh et al. (4,656,048) and Tseng et al. (6,309,711) are incorporated here.

Orme-Marmerelis et al. (6,520,402), Sterett et al. (5,746,844) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711) fail to specifically teach using compressed air for jetting the molten metal and using a mask to deposit the molten metal on a desired location of the substrate.

JP 11-040937 teaches injecting compressed gas in a pot of molten solder to jet the solder through a mask and onto a substrate (abstract).

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Orme-Marmerelis et al. (6,520,402), Sterett et al. (5,746,844) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711) process by incorporating a compressed gas to aid in the jetting of molten metal as well as the use of a mask to provide a desired pattern as evidenced by JP 11-040937.

While the Examiner acknowledges the fact that JP 11-040937 teaches molten metal whereas the instant claims are directed toward a molten metal for circuitry, it is the Examiner's position that the process disclosed is not limited to the material utilized. In fact, one skilled in the art at the time the invention was made would have had a reasonable expectation of achieving similar results with any molten "material".

*Response to Amendment*

7. Applicant's arguments filed 2/14/06 have been fully considered but they are not persuasive.

Applicant argued that the prior art fails to teach the newly recited limitation in claims 51-56, i.e. aerosol, compressed gas and a mask.

JP 11-040937 teaches these limitations as noted above.

Applicant argued that the prior art fails to teach “deposited metal grains overlap one another such that electric circuit has cross-sectional area stored in the second data between the points”.

Tseng et al. (6,309,711) teaches this limitation as noted above.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian K. Talbot whose telephone number is (571) 272-1428. The examiner can normally be reached on Monday-Friday 6AM-3PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy H. Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1762

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

B-K Talbot 5/2/06

Brian K Talbot  
Primary Examiner  
Art Unit 1762

BKT